Open Access Publishing and Institutional Repositories: An Overview

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Abstract

This paper introduces the concepts of open access publishing and institutional repositories. Examples of such repositories are given. An overview is provided of projects being funded by the Joint Information Systems Committee within the UK in higher education institutions and information on how some of the outcomes of this work can be useful to those in other countries is provided. The progress of the Wales Repository Network in developing an integrated network of institutional repositories in Wales is described. Finally, the author's experiences in the use of an institutional repository at Aberystwyth University, Wales are given.

Keywords: Open Access, Institutional Repositories

1. Definition of Terms

1.1 Open Access

In recent years many librarians and academic authors have become concerned at what is seen as the 'commercialisation' of scholarly journal publishing and the requirement for authors to sign over the copyright of a paper to the publishers prior to publication. Libraries need to pay increasingly large sums to subscribe to the printed copies of the journals or to acquire licences for access to electronic versions of them or else cancel subscriptions which results in researchers failing to have access to necessary source materials. The result has been a growth of the 'open access' movement.

In the UK the Joint Information Systems Committee (JISC) produced a briefing paper on open access in 2006 where it stated that:

"The World Wide Web has provided the means for researchers to make their research results available to anyone, anywhere, at any time. This applies to journal articles regardless of whether or not their library has a subscription to the journal in which the articles were published as well as to other types of research output such as conference papers, theses or research reports. This is known as Open Access." (http://www.jisc.ac.uk/publications/publications/pub_openaccess_v2.aspx)

A major 'mover and shaker' in the OA world is Stevan Harnad of Southampton University in the UK. He states that OA is the "free, immediate, permanent online access to the full text of research articles for anyone, webwide" (http://www.eprints.org/openaccess/). In 1995 Harnad made what became known as his 'subversive proposal' leading to the open access vision for scholarly material (Harnad, 1995). Since then there have been various international initiatives to progress the case for open access publishing. One of these was the Budapest Open Access Initiative (BOAI) of 2001 which resulted from a meeting organised by the Open Society Institute. Since 1993 the OSI in Budapest has developed and

implemented a number of programmes in the areas of educational, legal and social reform in former Soviet republics and countries of central and eastern Europe. OSI's Information Programme has supported a number of projects relating to open access including:

- the development of business models and plans for self-archiving and open access publishing;
- the use of library networks to mobilise support for open access;
- support for authors in low and middle income countries to publish in open access journals;
- the development of software tools and templates for open access publishing, self-archiving , indexing and navigation;
- the promotion of the open access philosophy.

The BOAI states that:

"An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds. Removing access barriers to this literature will accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge."

In 2003 a conference on open access to knowledge in the sciences and the humanities was held in Berlin with an outcome that has become known as the Berlin Declaration (http://oa.mpg.de/openaccess-berlin/berlindeclaration.html) and follow-on conferences have been held annually. The declaration states that: "the Internet offers the chance to constitute a global and interactive representation of human knowledge , including cultural heritage and the guarantee of worldwide access and that this challenge needs to be addressed through content and software tools that must be openly accessible and compatible".

There are two roads to OA publishing:

a) Gold OA. In this situation OA journals use a funding model that does not charge readers or their institutions for access. The Directory of Open Access Journals (DOAJ) is maintained by Lund University in Sweden and in early 2009 included details of 3,854 full-text, quality controlled scientific and scholarly journals, with 90 being categorised as being in the Library and Information Science area (examples include Ariadne, D-Lib Magazine and First Monday).

b) Green OA. In this case, authors publish papers in one of the 25,000 or so refereed journals in all disciplines and then self-archive these papers in open access repositories. Green OA publishing is aimed at making peer-reviewed research accessible to all through digital repositories which might be subject-based, or based within institutions.

Oppenheim has written a good overview paper outlining the situation, in 2008, with scholarly publishing and open access. In his conclusion he

notes that " Libraries will increasingly switch to OA sources, leading to libraries gaining a more prominent role in scholarly publishing with activity in both the preservation and distribution of scholarly research. Libraries will need to move from being passive to active players in the scholarly communication chain". Work in this area is also carried out by the Scholarly Publishing and Academic Resources Coalition (SPARC), and SPARC Europe. SPARC was developed by the Association of Research Libraries in the US with a focus is to stimulate the emergence of new scholarly communication models that expand the dissemination of scholarly research (http://www.arl.org/sparc/).

1.2 Institutional repositories

Writing in 2003, Clifford Lynch, the Executive Director, Coalition for Networked Information in the US, noted that; "In my view, a university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution."

There are other definitions as given in Charles Bailey's Introduction to institutional repositories. In its entry for institutional repositories Wikipedia states that: "An Institutional Repository is an online locus for collecting, preserving, and disseminating, in digital form, the intellectual output of an institution, particularly a research institution.

The four main objectives for having an institutional repository are:

- to create global visibility for an institution's scholarly research;
- to collect content in a single location;
- to provide open access to institutional research output by self-archiving it;
- to store and preserve other institutional digital assets, including unpublished or otherwise easily lost ("grey") literature (e.g., theses or technical reports). http://en.wikipedia.org/wiki/Institutional_repositories

An institutional repository differs from other digital collections that might be

offered by a university library (such as access to e-books, e-journal etc.) as:

- Content is deposited in a repository by the creator, owner and so on.
- Repository architecture manages the content and the metadata
- Repository software offers a minimum set of basic services – put, get, search
- Repository must be sustainable, trusted, well-supported and well-managed (Heery and Anderson, 2005).

Subject-based repositories of e-prints were pioneered in 1991 by Paul Ginsparg at the Los Alamos National Research Laboratory in New Mexico with a collection of preprints of articles in the subject area of high energy physics. This collection, known as arXiv, is now based at Cornell University (http://arxiv.org) and has grown to include over 520,000 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics.

In the 2000s work began in various academic institutions in creating their own repositories of e-prints. An institutional repository is a tangible indicator of research output of a university – thus increasing its visibility, prestige and public value. An IR can also be used as a marketing tool for the institution and allows an institution to manage its Intellectual Property Rights appropriately. Southampton University in the UK was an early developer and it produced software known as e-prints (Simpson, 2006). In the US the Massachusetts Institute of Technology (MIT) with Hewlett Packard developed other software, DSpace. Both of these are still popular choices for any institution currently developing an IR.

The range of material that might be covered by an IR includes:

- Pre-prints of papers
- Post-prints of papers
- Doctoral theses
- Masters dissertations
- Research reports
- Book chapters
- Conference papers
- Teaching materials
- Databanks of 'raw' data
- Multimedia objects

In a 2009 report on the research library's role in digital repository services written by a task force for the Association of Research Libraries in North America it was suggested that research libraries should undertake the following actions with respect to digital repositories:

- Build a range of new kinds of partnerships and alliances, both within institutions and between institutions.
- Base service-development strategies on substantive assessment of local needs rather than blindly replicating work done at another institution.
- Engage with key local policy issues and stakeholders to encourage institutional engagement with national and international policy issues.
- Develop outreach and marketing strategies that assist "early adopters" of repositories to connect with the developing repository-related service system.
- Define a scope of responsibility to guide the development of repository services for varied forms of content.

2. Examples of institutional repositories

2.1 CADAIR at Aberystwyth University (http://cadair.aber.ac.uk/)

Work on the development of an IR at Aberystwyth started in 2006. DSpace was chosen as an open source solution with a member of staff within Information Services (a central facility covering library services and computing facilities) responsible for its development. A repository manager was appointed in 2008 whose role is to assist in populating the repository. In early 2009 there were 1763 items included, mainly journal articles and conference presentations with some theses and dissertations. Figure 1 shows part of the opening page of CADAIR with the number of items included from various departments.

Figure. 1 Opening page of CADAIR

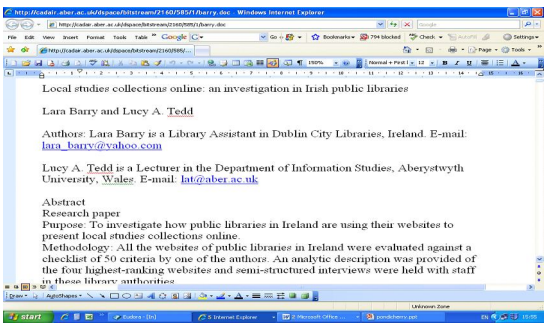
Figure 2 shows the metadata of a CADAIR item covering a conference presentation I made at the National Institute for Fashion Technology in India last year.

Figure 2 Metadata for an item in CADAIR

A click on the file name will give access to the full presentation – which is no longer available on the NiftIndia website.

Figure 3 gives the start of the full text of a paper published in Program: Electronic Library and Information Systems.

Figure 3. Start of the full text of a paper in a refereed journal



Local studies collections online: an investigation in Irish public libraries

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Abstract

Research paper

Purpose: To investigate how public libraries in Ireland are using their websites to present local studies collections online.

Methodology: All the websites of public libraries in Ireland were evaluated against a checklist of 50 criteria by one of the authors. An analytic description was provided of the four highest-ranking websites and semi-structured interviews were held with staff in these library authorities

It can be seen that the paper shown in Figure 3 is not as it would look in its final version in the Emerald-published journal and is a post-print i.e. it is the version of the paper as submitted for publication after the necessary referee-ing process and editorial changes. Publishers vary in their policies regarding the ability for an author to self-archive material. Emerald is (appropriately) categorised as a 'green' publisher by the SHERPA RoMEO service and the rules regarding self-archiving are shown in the record for Emerald in Figure 4. The development of the colour-coding system for publishers with respect to their policies for self-archiving by authors is described by Jenkins et al. (2007).

Figure 4. Information regarding the publisher Emerald on the SHERPA RoMEO service

DSpace is a popular choice for IRs in India too. Mittal and Mahesh (2008) provide details of some 22 organisations using DSpace in 2007. One of those was the National Institute of Ocenaography (NIO), which at the time of Mittal and Mahesh's survey had 627 items in its collection and by early 2009 this had grown to 2552. Figure 5 shows the opening page of the NIO digital repository.

Figure 5 opening page of National Institute of Oceanography Digital Repository Service

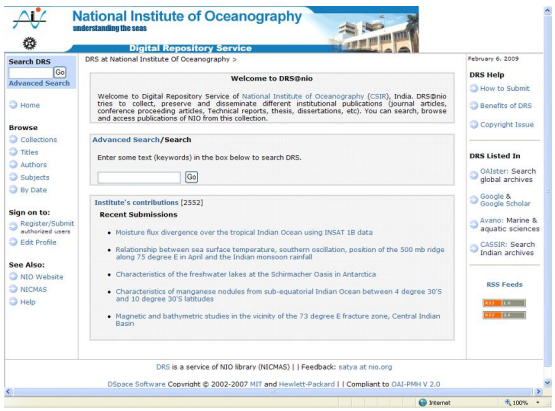
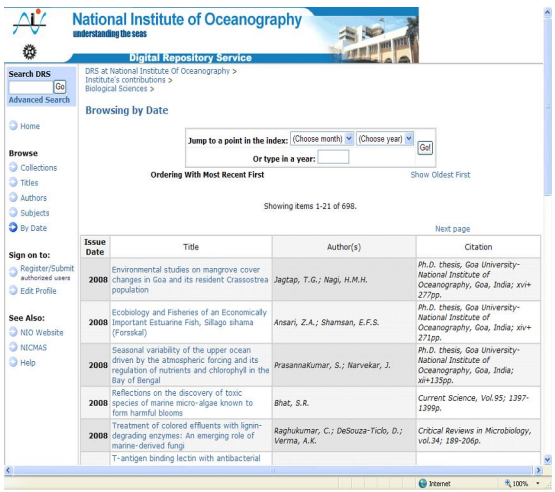


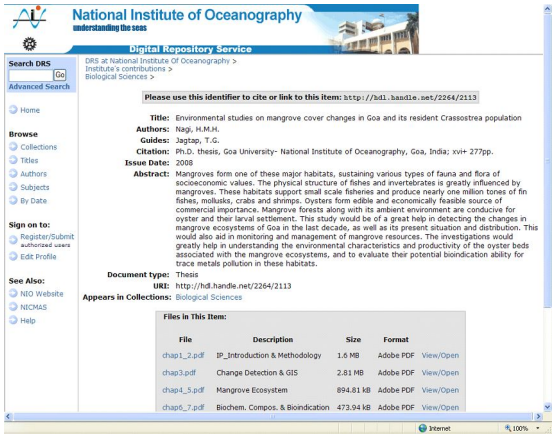
Figure 6 shows the results of browsing for the most recent entries in the Biological Sciences collection and it can be seen that there is a mixture of doctoral theses and articles published in journals.

Figure 6. Results of browsing recent entries in the Biological Sciences collection of the NIO repository



The metadata for the first thesis is given in Figure 7 and it can be seen how easy it would be for anyone around the world to now gain access to the full text of this research.

Figure 7. Example of the metadata for a PhD thesis



3. Institutional repositories around the world

There are now various international directories of institutional repositories. Examples are given here.

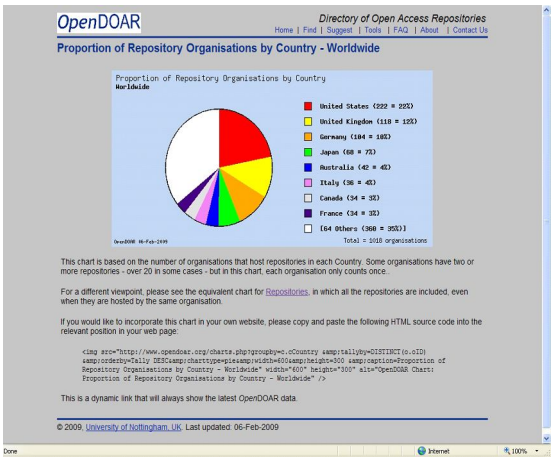
3.1 DOAR –Directory of Open Access Repositories

As given on its website (http://www.opendoar.org/about.html) the OpenDOAR service "provides a quality-assured listing of open access repositories around the world. OpenDOAR staff harvest and assign metadata to allow categorisation and analysis to assist the wider use and exploitation of repositories. Each of the repositories has been visited by OpenDOAR staff to ensure a high degree of quality and consistency in the information provided: OpenDOAR is maintained by SHERPA". The work of the OpenDOAR team at Nottingham University in the UK is funded by a number of organisations including the OSI, the JISC, the Consortium of Research Libraries (CURL) and SPARC Europe. There are currently 1300 repositories covered by OpenDOAR. Some of the 33 in India are shown in Figure 8.

Figure 8 Listing of some of the 33 repositories in India given in OpenDOAR

A chart showing the breakdown by country is given in Figure 9.

Figure 9 Pie chart showing breakdown of repository organisations in different countries.



3.2 ROAR – Registry of Open Access Repositories

ROAR is a parallel project to OpenDOAR and runs at Southampton University in the UK. It currently has 1247 entries, 40 of which are from India. Figure 10 shows some of the details included in ROAR for some Indian IRs. According to its website (http://trac.eprints.org/projects/iar/wiki) ROAR aims to "promote open access to the research literature pre- and post-peer-review through author self-archiving in institutional eprint archives. Open access to research maximises research access and thereby also research impact, making research more productive and effective.

This registry has two functions: (1) to monitor overall growth in the number of eprint archives and (2) to maintain a list of GNU EPrints sites (the software Southampton University has designed to facilitate self-archiving".

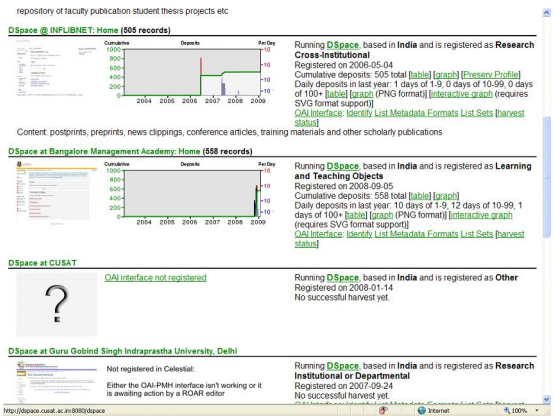
ROAR also keeps track of the archiving policies adopted by universities, funding bodies and so on with respect to authors depositing material in open access repositories (http://www.eprints.org/openaccess/policysignup/). By February 2009, 31 universities and departments (including Southampton, Glasgow and Stirling in the UK, Harvard and Stanford in the US, and the National Institute of Technology, Rourkela in India and Bharathidasan University) had adopted mandates requiring that authors they fund and employ to deposit the output of their research in open access repositories. In addition there were 34 research funding bodies (including all the UK Research Councils, the European Research Council and the US National Institutes of Health) that now operate similar mandates.

3.3 Ranking of World Repositories

The Ranking of World Repositories is produced by the Cybermetrics Lab, a research group belonging to the Consejo Superior de Investigaciones Científicas (CSIC), the largest public research body in Spain. One of the specific areas of research

undertaken by CSIC is quantitative studies about the scientific communication through electronic journals and repositories, and the impact of the OA initiatives. The aim of the ranking is, as stated on the website (http://repositories.webometrics.info/about_rank.html) to "support Open Access initiatives and therefore the free access to scientific publications in an electronic form and to other academic material. The web indicators are used here to measure the global visibility and impact of the scientific repositories". Figure 11 includes some of the listing of the 556 repositories (including CADAIR) covered in this directory.

Figure 10. Some details of Indian repositories included in ROAR



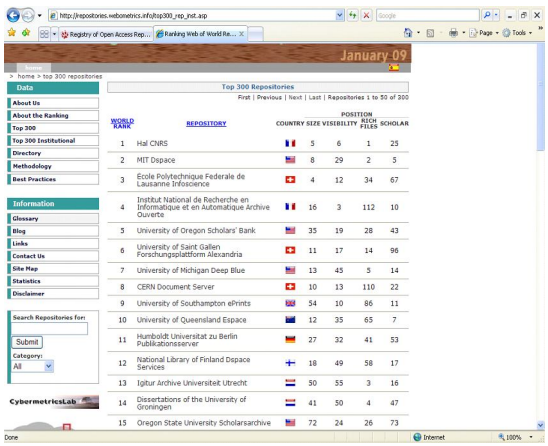
Various web indicators are then used to rank the repositories:

- Size (S). Number of pages recovered from Google, Yahoo, Live Search and Exalead.
- Visibility (V). The total number of unique external links received (inlinks) by a site can be only confidently obtained from Yahoo Search and Exalead.
- Rich Files (R). Only the number of text files in Acrobat format (.pdf) extracted from Google and Yahoo are considered.
- Scholar (Sc). Using Google Scholar database to calculate the mean of the normalised total number of papers and those (recent papers) published between 2001 and 2008.

The four ranks are then combined according to a special formula which results in the ranking as seen in Figure 12.

Figure 11 Alphabetic listing from the Ranking of World Repositories

Figure 12. World ranking of institutional repositories



4. JISC and institutional repositories

The JISC (http://www.jisc.ac.uk) is funded by the UK higher education (HE) and further education (FE) bodies to provide world-class leadership in the innovative use of ICT to support education and research. In particular its work covers:

- The Joint Academic Network (JANET) which links all HE and FE establishments to the Internet
- Access to electronic resources
- New environments for learning, teaching and research
- Guidance on institutional change
- Advisory and consultancy services (e.g Technical Advisory Service for Images, TechDIS for information on technology and disability).

JISC has had a number of funding programmes, as described below, linked to the development of institutional repositories and continues in this work through a current call for proposals for funding. The JISC-Repositories mailing list (JISC-REPOSITORIES@JISCMAIL.AC.UK) provides a lively discussion forum for those interested in the work of JISC and repositories.

4.1 Focus on Access to Institutional Repositories (FAIR) 2002-5

This programme (http://www.jisc.ac.uk/whatwedo/programmes/fair.aspx) started with a call for proposals in February 2002 which asked for projects to "support access to and sharing of institutional content within HE and FE and to allow intelligence to be gathered about the technical, organisational and cultural challenges of these processes" . This resulted in 14 projects including:

- Rights Metadata for Open Archiving (RoMEO)
- Secured Hybrid Environment for Research, Preservation and Access (SHERPA)
- Electronic Theses
- Theses Alive!

These projects sowed the seed for much of the later work related to institutional repositories in the UK. For instance, staff at Edinburgh University were involved in the Theses Alive project which then resulted in the Edinburgh Research Archive (http://www.era.lib.ed.ac.uk/) and also in a book (Jones et al., 2006). The SHERPA/RoMEO project has developed into a partnership of some 33 institutions, all research-led institutions and all with practical experience of building and populating e-print repositories. The information relating to publishers' policies on self-archiving maintained by SHERPA/RoMEO , as shown in Figure 4, can be used by anyone throughout the world.

4.2 Digital Repositories Programme 2005-7

The aim of this programme was to continue the work started under FAIR and "to bring together people and practices from across various domains (research, learning, information services, institutional policy, management and administration, records management, and so on) to ensure the maximum degree of coordination in the development of digital repositories, in terms of their technical and social (including business) aspects". (http://www.jisc.ac.uk/whatwedo/programmes/digitalrepositories2005.aspx). There

were some 30 projects funded during this 3-year programme – some built on earlier work (e.g. SHERPA) and others (e.g the EThOS project for a system of UK-wide electronic theses deposit) covered newer ground.

4.3 Repositories and Preservation Programme 2007-9

The aim of this programme, which comes to an end in March 2009, is to " fund initiatives to develop the Information Environment supporting digital repositories and preservation, including cross-searching facilities across repositories; funding for institutions to develop a critical mass of content, preservation solutions and advice for the development of repositories" (http://www.jisc.ac.uk/whatwedo/programmes/reppres.aspx). There is a very large number of separate projects funded under this £14m. programme – almost 90. Examples of some of the projects are:

- Bradford University repository project (BURP)
- Federated Access to Repositories (FAR)
- KULTUR – a consortium to create a transferable and sustainable institutional repository model for research output in the creative and applied arts.

4.4 Repository Support Project (RSP)

The RSP is one of the many projects funded as part of the Research and Preservation programme. It has been a 2.5 year project to "co-ordinate and deliver good practice and practical advice to English and Welsh higher education institutions to enable the implementation, management and development of digital institutional repositories" (http://www.jisc.ac.uk/whatwedo/programmes/reppres/repsupport.aspx). As with many of the JISC-funded projects it has involved a consortium including staff from Nottingham University, Southampton University, UKOLN at Bath University as well as Aberystwyth University.

The opening page of the RSP website (http://www.rsp.ac.uk) is shown in Figure 13 where it can be seen (down the left hand side) that there are links to many sources of information to assist anyone throughout the world who is involved in developing an institutional repository. These are being used. For instance, the Digital Repository Federation of Japan has translated the RSP planning checklists into Japanese.

Figure 13. Opening page of the RSP website

4.5 Welsh Repository Network (WRN)

The WRN is another project that has been funded by JISC under the Repositories and Preservation Programme. It has been run by Aberystwyth University, on behalf of WHELF (Wales Higher Education Libraries Forum), and aims to put in place an essential building block for the development of an integrated network of institutional digital repositories in one region of

the UK – the country of Wales. At the start of the project in 2006 just two (Aberystwyth and Cardiff) of the higher education institutions in Wales had institutional repositories - and they were still operating as pilot projects. The WRN will be launched in February 2009 and staff from Aberystwyth have provided help, training and advice, using materials developed as part of RSP, for the participating institutions. In addition money has been available for the acquisition of appropriate hardware and software to support the development of the individual repositories. Although Aberystwyth uses DSpace for its CADAIR repository individual institutions were free to choose their own software – one chose Eprints, one BEPress and the others chose DSpace. Various presentations on the work of the WRN, and Aberystwyth's work on the RSP, are available via CADAIR.

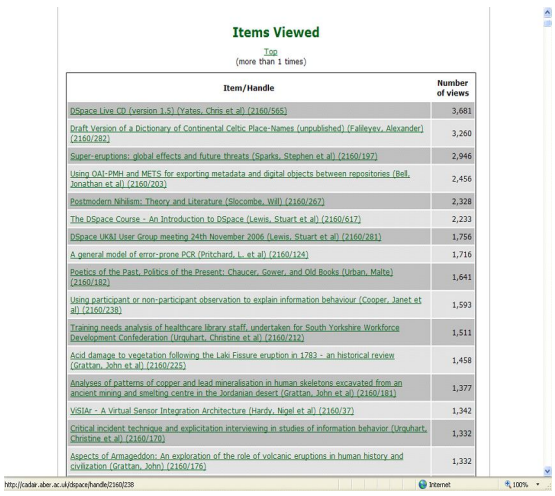
5. Academic staff and institutional repositories: some personal experiences

In 2004 there was a presentation at the National Library of Wales of some of the projects from the JISC-funded FAIR programme and this alerted me to the whole area of institutional repositories. In my department I thus became one of the early adopters of Aberystwyth's IR, CADAIR, when it was piloted by Information Services staff as part of the JISC-funded Repository Bridge project (Bell and Lewis, 2006). I have since been involved in attempting to help and encourage colleagues to deposit material. This has not been easy. As well as issues related to copyright aspects and the legal issues academics are not always able to retrieve the final 'post-print' version of a paper as accepted for publication. In the RSP documentation on Making a case for a repository some of the advantages for researchers are highlighted and these include:

- Increased visibility of research output and consequently the department and the institution
- Potentially increased impact of the research
- Help in managing and storing digital content connected with the research, including the underlying research data
- Help in managing the likely requirements of funding bodies for publications to be made available in a repository.
- Provides the possibility to standardise institutional records
- Allows the creation of personalised publications lists
- Offers usage metrics to determine hit rates on specific papers.

Looking at the statistics of use (as shown in Figure 14 for CADAIR) might encourage academics to deposit material – especially if impact of research becomes a key factor in research assessment procedures.

Figure 14. Statistics on use of materials in CADAIR



Items Viewed

Top
(more than 1 times)

Item/Handle	Number of views
DSpace Live CD (version 1.5) (Yates, Chris et al) (2160/565)	3,681
Draft Version of a Dictionary of Continental Celtic Place-Names (unpublished) (Falileyev, Alexander) (2160/282)	3,260
Super-eruptions: global effects and future threats (Sparks, Stephen et al) (2160/197)	2,946
Using OAI-PMH and METS for exporting metadata and digital objects between repositories (Bell, Jonathan et al) (2160/203)	2,456
Postmodern Nihilism: Theory and Literature (Slocombe, Will) (2160/267)	2,328
The DSpace Course - An Introduction to DSpace (Lewis, Stuart et al) (2160/617)	2,233
DSpace UK&I User Group meeting 24th November 2006 (Lewis, Stuart et al) (2160/281)	1,756
A general model of error-prone PCR (Pritchard, L. et al) (2160/124)	1,716
Poetics of the Past, Politics of the Present: Chaucer, Gower, and Old Books (Urban, Malte) (2160/182)	1,641
Using participant or non-participant observation to explain information behaviour (Cooper, Janet et al) (2160/238)	1,593
Training needs analysis of healthcare library staff, undertaken for South Yorkshire Workforce Development Confederation (Urquhart, Christine et al) (2160/212)	1,511
Acid damage to vegetation following the Laki Fissure eruption in 1783 - an historical review (Grattan, John et al) (2160/225)	1,458
Analyses of patterns of copper and lead mineralisation in human skeletons excavated from an ancient mining and smelting centre in the Jordanian desert (Grattan, John et al) (2160/181)	1,377
ViSIAr - A Virtual Sensor Integration Architecture (Hardy, Nigel et al) (2160/37)	1,342
Critical incident technique and explicitation interviewing in studies of information behavior (Urquhart, Christine et al) (2160/170)	1,332
Aspects of Armageddon: An exploration of the role of volcanic eruptions in human history and civilization (Grattan, John) (2160/176)	1,332

A full-time Repository Manager for CADAIR has been in place since September 2007 and one role of this person has been to talk to staff in individual departments to encourage use. There is much advice for repository managers wishing to promote and populate their repositories on the RSP website (e.g. http://www.rsp.ac.uk/pubs/briefingpapers-docs/repoadmin-promotion.pdf). In 2008 there was a major Research Assessment Exercise affecting all universities in the UK and a decision was made in Aberystwyth to include the metadata for all items submitted to the RAE to be included on CADAIR.

In 2008 Aberystwyth University mandated that all doctoral theses and masters dissertations gaining distinction be deposited in CADAIR. At a research school for masters students held in early February in my department the Repository Manager came to talk to students about CADAIR and the requirement for their dissertations to be submitted electronically. Academic staff supervising masters and doctoral students will need to ensure the appropriate copyright compliance in the work of their students with the outcomes being available electronically.

6. Conclusion

Although it is 18 years since the setting up of the Arxiv digital repository, and 16 years since Harnad's original proposal for open access it is really only in the last few years that there have been major developments in the area of open access and institutional repositories. This has come about from the mandates decreed by various funding institutions as well as individual universities and departments. As a result many institutions around the world are now involved in developing their own repositories. As Oppenheim (2008) concludes " we can expect funders to continue to move towards requiring OA outputs from the recipients of their funding, and institutions to move steadily towards mandating OA. It will be an interesting time."

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